Economic evaluation of caspofungin versus liposomal amphotericin B for empiric antifungal treatment in patients with neutropenic fever in Italy

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective was to assess the cost-effectiveness of caspofungin compared with liposomal amphotericin B as antifungal treatment for patients with neutropenic fever. The authors concluded that caspofungin was cost saving and more effective than liposomal amphotericin B and could be considered a cost-effective therapy for these patients. These conclusions appear to be reliable, assuming that no other relevant clinical data were available.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of caspofungin compared with liposomal amphotericin B (LAMB) as antifungal treatment for patients with neutropenic fever.

Interventions
Treatment with caspofungin 70mg on day one and 50mg daily thereafter was compared with LAMB 3mg per kg per day.

Location/setting
Italy/secondary care.

Methods
Analytical approach:
The authors used a decision-tree model to combine the costs and effectiveness data, from a clinical trial, with estimates of life expectancy, utility estimates, and medical resource consumption and costs from other sources. The authors stated that the perspective was that of the hospital and the time horizon was the life expectancy of the patients.

Effectiveness data:
The evidence came primarily from a randomised controlled trial (Walsh, et al. 2004, see ‘Other Publications of Related Interest’ below for bibliographic details). The main clinical parameters were the resolution of baseline infections and fever, breakthrough infections, and survival.

Monetary benefit and utility valuations:
The utility estimates were derived from the CEA Registry results published by Tufts New England Medical Center (http://www.tuftsmedicalcenter.org/default). A range of utility values were derived using different methods and the alternatives were used in a sensitivity analysis.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs) gained.

Cost data:
The direct costs included those of drugs, treating drug-related toxicity and adverse events, and hospital stays. The drug unit costs were based on published data from the Italian Drugs Agency. The costs of treating drug-related toxicity and adverse events were based on expert opinion, except for haemofiltration costs, which were from a publication (Vitale,
et al. 2003, see ‘Other Publications of Related Interest’ below for bibliographic details). The costs of hospital stay were obtained from a combination of published sources. The currency was Euros (EUR) and the price year was 2007.

Analysis of uncertainty:
The effect on the model outcomes of uncertainty in the parameter estimates was assessed using probabilistic sensitivity analysis.

Results
The estimated total cost of treatment was EUR 8,351 with caspofungin and EUR 11,821 with LAMB, which was EUR 3,470 less for caspofungin with a 95% uncertainty interval (UI) of 2,575 to 4,382. Treatment was estimated to result in a loss of 0.50 QALYs with caspofungin and 0.75 QALYs with LAMB, which was a gain of 0.25 QALYs (95% UI -0.11 to 0.59) for caspofungin treatment.

Treatment with caspofungin was dominant, which means it was more effective and less costly than treatment with LAMB.

The results of the probabilistic sensitivity analysis suggested that there was a 93% probability that caspofungin was dominant. The outcomes of the model remained consistent to variations in the key parameters, for example reducing the dose of caspofungin to 1mg per kg produced a cost per QALY saved of EUR 7,972 and an 80% probability of cost-effectiveness.

Authors’ conclusions
The authors concluded that caspofungin could be considered a cost-effective therapy for the treatment of fungal infections in patients with neutropenic fever.

CRD commentary
Interventions:
Both interventions were well described. The analysis included the current practice in the Italian setting according to an observational study, but the authors acknowledged that conventional amphotericin B was the accepted treatment. You may wish to consider whether the comparator is appropriate and relevant to your setting.

Effectiveness/benefits:
The effectiveness data were primarily derived from a single study. The full details of this study were not provided, but the reference was given. The authors did not provide details of the methods used to review the available literature, which means it is not possible to ascertain whether the best available evidence was used. They acknowledged that the external validity of the results was limited by their reliance on this single study and caution is advised when extrapolating these findings to other settings. The utility estimates were obtained from one source and the reference was given, but the methods used to derive these estimates were not reported. Sensitivity analyses were conducted to evaluate utility estimates derived using different methods.

Costs:
The authors stated that the perspective was that of the hospital, and they appear to have collected those direct costs relevant to this perspective. The cost estimates were based on a combination of expert opinion and published studies and may have been relevant to the population and setting. The costs were presented as totals and not itemised, which limits the possibility of replicating the cost analysis elsewhere and extrapolating the results to other settings. The price year was provided, but no details of any discount rate for costs were provided.

Analysis and results:
The analytical approach was satisfactorily reported and the model structure was reported in full, with a diagram. The incremental approach was appropriate for comparing the cost-effectiveness of the two strategies. The results were presented clearly and in full and appropriate sensitivity analysis was performed. Probabilistic sensitivity analysis is a thorough method of capturing the parameter uncertainty. The reporting of both the base case and the sensitivity analyses was satisfactory. The authors described a number of strengths and limitations of their study.
Concluding remarks:
Overall, the methodology and the reporting of the study were satisfactory. The authors acknowledged a number of weaknesses of their study. Their conclusions appear to be reliable for the study setting, assuming that no other relevant clinical data were available.

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